Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
Amendment of Sections 15.35 and 15.253 of the	)	ET Docket No. 11-90
Commission's Rules Regarding Operation of	)	
Radar Systems in the 76-77 GHz Band	)	RM-11555
	)	
Amendment of Section 15.253 of the	)	ET Docket No. 10-28
Commission's Rules to Permit Fixed Use of	)	
Radar in the 76-77 GHz Band	)	

RESPONSE TO THE OPPOSITION OF AUTOLIV AND OTHERS TO NAVTECH RADAR PETITION FOR RECONSIDERATION OF FCC-12-72A1 RELEASED 2012-08-21

Navtech Radar submits these comments in response to the opposition of Autoliv and others in the petition for reconsideration of FCC-12-72A1 Pursuant to Section 1.429 of the Commission's rules.

Navtech Radar Response

Navtech are a small business with a modest sales book and a portfolio of equipment that serves the public interest, whether that is security around critical infrastructure or safety upon highways, and would respectfully request that consideration of the Regulatory Flexibility Act 1980 be applied. The products manufactured by Navtech can be used for a range of applications and can enhance homeland security, deter dangerous behavior on the highways, as well as provide Automatic incident detection for road users. Alternatively our equipment is used as a safety device for industrial automation where the radar will help to prevent collisions between machine and man or machine and other equipment (providing both safety for people and safety for high value assets).

Opposition to Navtech Radar from Autoliv and others is fundamentally based on 3 criteria;

1. Navtech did not comply with 1.429(b) of the Commission's Rules (47 C.F.R. § 1.429) in having reason to submit the petition for reconsideration.
2. Navtech did not file in a timely manner its petition for reconsideration in compliance with 1.429(d) of the Commission's Rules (47 C.F.R. § 1.429).
3. Navtech Radar fixed infrastructure radar systems are not able to co-exist with vehicle radar systems as there may potentially be an interference issue.

Many of the submissions of opposition are filed late i.a.w. the Federal register and should be dismissed without review [*Robert Bosch page 7*]. Irrespective of the lateness of all submissions; it may be that FCC deems that it is in the public interest, to consider such objections. Navtech Radar would promote such a view

in the same way that it feels it to be in the public interest to have the commission review its Petition for reconsideration.

BMW

The BMW opposition is based upon a reference to the MOSARIM study. The MOSARIM project, which comprises of a consortium of automotive industry companies, is unfortunately not independent or impartial. There is a lack of willingness by the consortium to work with other manufacturers outside of the automotive industry that can be seen from MOSARIMS own reports and methods. Formed in January 2010, after only a few months its members had identified Navtech Radar products as using the same frequency band, obtained copies of the Marketing literature and images of an existing fixed infrastructure site and subsequently used both images and reproduced copies of the marketing literature in a report published in December of 2010. While this in itself is of no consequence, the concern is that MOSARIM failed to contact Navtech to discuss involvement in the study but did produce data results from a radar which they did not in fact test [report *D1.7 –V1.2*] referencing the Navtech TS350-X radar as an example and provides data sets and conclusions without any form of consultation with Navtech. This seems like not only a poor methodology for conducting a study, but also shows a lack of willingness to work together, to either prove or disprove that interference effects occur between fixed and vehicle radar.

When details of the MOSARIM program became known to Navtech Radar, in good faith they attended a one day test program in southern Germany in October 2012. The intention during the day's tests was to see if interference effects were seen between fixed and vehicular based radar systems to any greater extent than between different vehicular based systems. The ensuing MOSARIM report from this test day was little more than a political statement, with the sole intention of restricting band usage to all road safety applications other than automotive radar.

It is highly dubious to suggest that a small number of fixed radar, mounted 4m above a carriageway, illuminating the highway only twice a second and installed at a density of only 1 to 2 every mile, should constitute an interference risk at anything approaching the levels that are likely when numerous vehicles drive together on a busy carriageway.

Without consideration to careful design, multiple similar radar, densely packed on vehicles, could indeed interfere and it was seemingly for these very reasons that the MOSARIM project was constituted. A number of interference mitigation techniques are proposed by automotive radar manufacturers for vehicle to vehicle interference mitigation. These include but are not limited to: detect interference and repair the results in the time domain; detect and change the frequency range; measure and then re-measure after a short time period. The last method is particularly pertinent, since Navtech Radar are mechanically scanning and illuminate the highway with minimal duty cycle, a detect and re-measure methodology would be highly effective. Detect and change transmit frequency is also available, if only the automotive manufacturers would engage properly with other fixed radar safety system manufacturers. Furthermore, Navtech's radar devices are typically mounted well above the carriageway, further limiting the chance that fixed and vehicular radar should interfere with each other.

MOSARIM study reports are available in the public domain {limited}. Even within these there are inconsistencies between the observed interference effects between and fixed radar and vehicular based radar. In December 2010, a worst case fixed/vehicular based interference calculation led to the conclusion that "…a noise increase of ca. 2dB is expected which means a rather small reduction of the range covered by the victim." [Report D1.7 v1.2 pg. 57]. A later document [Interference tests with Navtech TMS radar, 30 Nov 2012], reaches a wholly different conclusion. Furthermore the MOSARIM status update from the project website proclaims;

"Unwanted mutual influence between vehicular radar systems may occur, similar to other environmental sensing technologies like lidar or ultrasonic. First project results indicate that the probability of occurrence is limited and influences can be counteracted. Mitigation countermeasures evaluated in the MOSARIM project so far have the potential to avoid any malfunction completely".

Autoliv:

It is with surprise that we noted Autoliv objections to the use of Navtech fixed radar. As Autoliv point out they are based in Stockholm, a city that has several of our Radar systems in operation in and around the city, while Autoliv enjoy the benefits of the enhanced safety provided by these systems, they seek to deny that same level of safety and peace of mind to the public in the United States.

Autoliv opposes the petition on two counts. Firstly that Navtech Radar did not comply with a procedural rule. Secondly that Navtech has failed to show that the fixed radar can coexist with that of vehicular radar without causing Interference.

Section 1.429 (b) of the Commissions roles states that a petition for reconsideration relying on facts which have not been previously presented to the Commission will be granted only in one of three circumstances.

1. Where the facts relied upon relate to events which have occurred or circumstances which have changed since the last opportunity to present them to the Commission.
2. Where the facts relied upon were unknown to the petitioner until after the petitioners opportunity to present them to the Commission and the petitioner could not through the exercise of ordinary diligence have learned of the facts in question prior to such opportunity.
3. The Commission determines that consideration of the facts relied on, is required in the public interest.

Navtech would assert that a change in circumstances occurred after FCC 11-79 released May 25 2011, within this document the Commission stated the following;

1. "Allow their use in fixed infrastructure systems"- paragraph 1 page 1.
2. "Enable the automotive and fixed radar application industries to develop enhanced safety measures" – paragraph 1 page 1.
3. "The current rules should be relaxed to allow the operation of fixed radars in the 76-77 GHz band on an unlicensed basis. It [FCC]therefore proposes to permit fixed radars to radar systems meet the proposed limits for vehicular radar systems as well as the maximum permissible RF exposure levels set forth in the rules". See paragraph 9 of the following link.

https://www.federalregister.gov/articles/2011/06/16/2011-14744/operation-of-radar-systems-in-the-76-77-ghz-band

4. "The Commission is not proposing to limit operation to monitoring vehicles or to specific locations such as airports or other places where fixed radars would not illuminate public roads". See paragraph 9 of the previous link.

The change from 11-79 to 12-72A1 where the use of fixed infrastructure applications went from extensive permissions relative to usage of fixed radar products, to a more limited use of fixed infrastructure radar that would not permit, under the proposed rule change, use of the Navtech Radar products. This complies with point 1 of section 1.429 (b). Further Navtech strongly believe that it is in the public interest that this petition be considered which would be in compliance with point 3 of 1.429(b). As the products made available by Navtech Radar are purely related to the health and safety of the public then we respectfully suggest that it is in the public interest for the Commission to consider any petition for reconsideration. There is no compelling evidence to suggest that Navtech Radar products, properly installed IAW the manufactures guidelines, will

cause interference levels beyond those of vehicle to vehicle radars. As previously stated, the MOSARIM study has been unduly pejorative.

Mercedes-Benz [1]

Mercedes-Benz have stated that they believe use of the 76/77 GHz fixed radar installations near roads is likely to cause substantial interference between the fixed radar systems and automotive radar systems operating in the same frequency band. The speculative referral by Mercedes-Benz to a "likely" to be substantial issue is without merit and put to proof. By the same measure, it might also be said that numerous vehicular based radar systems operating in the same band, in heavy traffic are *very highly likely* to be a substantial issue. In addition, Mercedes-Benz talk extensively of collision avoidance and it is known that the automotive industry are also utilizing the 79GHz band for automotive safety radar purposes. Indeed the Automotive industry has use of the spectrum in the 76-77 GHz band as well as requesting usage of the spectrum from 77-81 GHz. Far from sharing the spectrum the automotive industry continue to seek for more and more exclusive use of the spectrum band width available. Navtech Radar fully supports the safety measures and initiatives being taken by the automotive industries and although it recognizes the benefit this brings in terms of accident reduction it must not be overlooked that the products Navtech Radar wish to bring to market are able to enhance road safety in ways not possible with solely vehicle mounted radar. The Automatic Incident Detection capability allows road users to be warned well in advance of an upcoming accident, stranded vehicle, or even an animal on the road. Highways message signs can be activated, diverting traffic into unobstructed lanes in these circumstances. Fixed infrastructure radar is needed to scan the highway at critical locations, operating in all-weather and lighting conditions. Fixed radar is also in effective use for train/road crossing obstacle detection and for National security (where a single incident might jeopardize more than just public safety but risk a great many lives.)

Toyota

Navtech observed that, on 25th May 2011 in FCC 11-79 [page 7 (paragraph 17)] that they [FCC] were "not proposing to limit operation [of fixed radar in the 76-77 GHz band] to monitoring vehicles or to specific

[1]*It is noted that Mercedes-Benz have filed their opposition on the 6th December. On page 4 (paragraph 2) Mercedes have stated that Navtech filed its petition on 10th October 2012. The actual date of filing was 5th September 2012 well within the 30 day period after the publication of the report and order in the Federal Register.*

locations such as airports or other places where fixed radar would not illuminate public roads" believing that such constraints would be "overly restrictive"). Furthermore ;

"The Commission also believes that fixed radars should be able to co-exist with vehicular radars because they would both operate with the same power level and because both would use antennas with narrow beam-widths, thus reducing the chances that the signal from one radar would be within the main lobe of the receive antenna of the other. In a worst case scenario where two radars are aimed directly at each other, fixed radar should have no more impact on a vehicular radar system than another vehicular system would."

Navtech felt there was no need to add further comment either at that time nor at any time until the release of FCC-12-72A1 on 5th July 2012 where the Commission stated that due to a lack of any company coming forward with a clear demand for fixed infrastructure use in this band applications would be limited to those within airport locations. This Change fell under 1.429(b).

Continental Automotive Systems Inc

Continental has focused on the MOSARIM report; to reiterate, the results of the MOSARIM project are contradictory. On the one hand vehicular radar manufacturers are adamant that reliable vehicle to vehicle radar operation in densely packed traffic is an entirely solvable problem, using a range of interference mitigation techniques. On the other hand a small number of fixed radar, mounted typically 4m above the road traffic and with very low duty cycle (due to mechanical scanning) is unmanageable. Early MOSARIM reports [D1.7 v1.2] measure the effects of fixed to vehicular radar interference as having very little effect. Later results seem contrived for the perceived purpose of limiting band usage solely to vehicular radar. Continental continue by stating Radar with high transmit power cannot be used. Navtech products have been independently tested and have a power output well within the terms set out both by FCC and ETSI for vehicular based radar systems. Continental also claim that road side radar use a large proportion of the available bandwidth, without mentioning that adaptive bandwidth reduction techniques, should they be required, could equally well be adopted by fixed as well as vehicular radar systems

Alliance of Automotive Manufacturers Inc

The Alliance follows the same trend as all other oppositions in that their submission references MOSARIM. The Alliance also expressed concern over incompatibility and interference voicing objections to the Petitions validity under sections 1.429(b). Navtech Radar has shown it meets the criteria to apply under 1.429(b) for

both reasons of change and more significantly this matter being in the Public Interest. All other points are dealt with in other parts of this response.

Robert Bosch

Robert Bosch astutely point out the changes made to 15.35 of the commission's rules and their importance to the Automotive Industry, which Navtech Radar duly acknowledge, and would point out that such changes are equally important to other industries such as fixed infrastructure radar and its evolution in the market place for a multitude of applications that enhance both safety and quality of life to the Public. The submission goes on to point out that the commission allowed only a limited use of non-automotive applications in FCC 12-72 but neglects to mention that despite this the commission made clear that they;

"Continue to believe that vehicular radars should be able to share the band with fixed radars operating at the same levels"

In paragraph 2 Robert Bosch attempts to build a case for not allowing the use of a "new" technology which may "potentially" have compatibility issues with automotive radar technology used by existing users in the market. In reply Navtech would say that this is not a "new" technology but rather an established, tried and tested product in a multitude of applications including the monitoring of highways for accidents, dangerous drivers, people and debris and that these safety of life usages of the spectrum should be an integral part of not only the European markets (as they are currently) but of the United States also. Having been in use for over 13 years it would be both unrealistic and burdensome to list every application in operation but rather from a few clear examples it can be seen that the fixed radar has to date managed to integrate with those of the Automotive industry without report of incident. Whilst volume is no measure of test for incompatibility we would point the commission instead to the Hindhead tunnel in England where an average of 35,000 vehicles per days travel through a twin bore tunnel with both bores containing Navtech fixed radar providing full coverage for Automatic incident detection. This tunnel has been in operation for 589 days and therefore has had over 20million vehicles pass through of which a significant number will have had 76-77GHz radar fitted and with no reported incidents. Robert Bosch might say that this data is meaningless, as a driver might not be aware of any alleged interference issues unless his ACC were deployed and failed to activate. Navtech would say that there must be a measure in a live environment where it can be determined that the fixed radar deployments apparent lack of interference with automotive radars is a qualitative metric and that at over 20

million vehicles this is indeed such a metric. In paragraph 3 of their Opposition to Petitions for Reconsideration, Robert Bosch state that:

"The Commission did affirmatively find, on the record in this proceeding, that there is compatibility between automotive radar systems and certain airport radar systems under the conditions permitted in the amended Section 15.253. The record does not support any such conclusion with respect to fixed radars generally at 76-77 GHz"

We respectfully suggest that this is an error by Robert Bosch, as previously highlighted the FCC have reported; "Continue to believe that vehicular radars should be able to share the band with fixed radars operating at the same levels" page 9 paragraph 26 of FCC-12-72A1. In paragraph 4 Robert Bosch focuses, as have the other automotive companies, on the MOSARIM report. This has been extensively covered previously in this document, under responses to BMW and to Continental.

The Objectives of MOSARIM are as follows;
[https://assrv1.haw-aw.de/mosarim/images/mosarim/documents/mosarim_projectfactsheet.pdf]

1. Assessment of the actual radar interference potential and impact with off-the-shelf radar sensors already available on the market.
2. Specification and implementation of a vehicular norm radar interferer.
3. Elaboration of comprehensive and realistic simulation models regarding radar interference on different levels.
4. Detection of commonly applicable interference countermeasures to reduce mutual radar interference disturbance.
5. Generation of recommendations and guidelines for vehicular mutual radar interference mitigation.

Navtech Radar has requested of the MOSARIM consortium that they be allowed to join and participate in MOSARIM-2 in an effort to work together and jointly address any concerns. This request was refused. Navtech fully appreciate and support the MOSARIM objectives, but fail to see why any consortium should be allowed to close ranks to solve its own problems at the expenses of a small and non-competing manufacturer. In Europe the band is currently shared, despite the protestations of the Automotive Industry and elsewhere Navtech Radar products are sharing the band with the Automotive Industry. Indeed it can be noted that Robert Bosch in paragraph 10 asks whether Navtech Radar could switch to a different frequency that is available. As is well known to Robert Bosch Navtech Radar is a small business without the resources of a multinational corporation such as BMW, Autoliv, Mercedes-Benz, Toyota or Robert Bosch. Navtech have been using the 76-77GHz band for around the same length of time and built the company around the use of this frequency. With installations not only in Europe, but also further afield. The foundations of the

company are deeply rooted in the 76-77GHz band. The idea of a change of frequency is however not without merit. Given the resources and the significant allocation of spectrum already available to the automotive industry, not to mention the added spectrum applied for, it would be more practicable for the automotive industry to relocate band. On page 10 of Robert Bosch's submission they intimate a lack of reported interference occurrences are due to the low vehicle numbers fitted with 76-77GHz radar "the percentage of vehicles now on the road that are equipped with 76-77 GHz automotive radar systems is relatively low" This may be the case, but as the projected number of vehicles fitted with such equipment are set to rise, then vehicle to vehicle interference must be solved, if the technology is to be widely and successfully deployed. We would submit that there is then no conceivable reason why fixed radar should not also be used, alongside the numerous products from different automotive manufactures.

To the erroneous claim of Robert Bosch that Navtech Radar filed in a "fatally untimely" manner Navtech would say that this should be dismissed as without merit. Finally, Robert Bosch make the comment [paragraph 12] that "In Europe, the automotive industry has objected to the continuation of fixed and automotive radar at 76-77 GHz because there have been incompatibilities noted and instances of increases in harmful interference to automotive radar systems from such fixed uses, and this has triggered the ECC/CEPT study plan." Bosch are put to proof and we would ask that they immediately provide examples of "instances of increases in harmful interference".

Conclusions

Navtech Radar manufactures a range of radar systems, all of which are in the 76-77GHz frequency band. These products meet the criteria set by ETSI for average and peak power density and the products are in use within Europe, Australia and parts of SE Asia, for a range of applications that have at their core the protection of life and property. These applications include Security for homeland defense, Incident detection on highways (for early notification of approaching drivers, and avoidance of secondary accidents) and anti-collision on robotic vehicles and other Industrial platforms. Navtech Radar legitimately filed a petition with FCC for reconsideration in a timely manner. The filing complied with section 1.429(b) parts 1 and 3 that being a change in circumstance (namely FCC 11-79 allowing the use of the band and FCC-12-72A1 not allowing it.)

Navtech Radar 76-77GHz radar systems have been used globally for over 13 years and there are noteworthy reference sites established. Further, the public demands solutions to hazards that threaten life whether that be anti-collision on Industrial Automation devices, Incident detection on Interstate and highways, the detection of large animals on the Highway and subsequent automatic warnings provided by the radar, or simply the peace of mind that comes from having a Navtech Radar protect its homeland (whether that be border protection, airfield detection data center protection or indeed the perimeter security of power plants). It was with enthusiasm that Navtech Radar noted the Commissions intention to allow wider usage of fixed radar in this band, under 11-79 from 25 May 2011. Likewise that the commission observed " We continue to believe that vehicular radars should be able to share the band with fixed radars operating at the same levels" [page 9 paragraph 26 of FCC-12-72A1]. Navtech Radar would, with utmost respect, request that consideration be given to reverting to this prior position, and that a wider range of fixed radar applications be permitted.

Finally, in the FCC Final Plan for Retrospective Analysis of Existing Rules published May 18, 2012 the following was stated;

"In response to comments received in connection with a review of regulations pursuant to Section 610 of the Regulatory Flexibility Act, the Commission issued an NPRM to modify its rules regarding vehicle radar technologies to improve collision avoidance and driver safety (Amendment of Sections 15.35 and 15.253 of the Commission's Rules Regarding Operation of Radar Systems in the 76-77 GHz Band, Notice of Proposed Rulemaking, 26 FCC Rcd 8107 (2011). The proposed rule modifications provide for more efficient use of spectrum while enabling the automotive and fixed radar application industries to develop enhanced safety measures for drivers and the general public."

Navtech Radar can only assume that as the Automotive Industry companies (who do not fall under the RFA) are generally concerned with vehicle mounted radar, that the RFA is referring to fixed radar applications and the protection of small business entities in the United States who might be linked to products such as those offered by Navtech Radar.

Respectfully submitted this day 11 December 2012

Dennis Farrell

Dennis Farrell

International Sales Manager
Navtech Radar Ltd.
Tel: +44 1235 832419
Cell: +44 7540 221460
email: Dennis.Farrell@Navtechradar.com